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ART UNIT	PAPER NUMBER
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/781,354	DICKEN, VOLKER	
	Examiner	Art Unit	
	Daniel F. Hajnik	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3,5,7-9,13-15 and 18-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3,5,7-9,13-15 and 18-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/2/2007 has been entered.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 8, 9, and 14 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 8, 9, and 14 are rejected under 35 U.S.C. 101. The claimed invention is directed to non-statutory subject matter. That is, the claims are directed to a program product, which is a functional descriptive material per se. In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. "Functional descriptive material" is nonstatutory when claimed as descriptive material per se. When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be

statutory in most cases since use of technology permits the function of the descriptive material to be realized.

To expedite a complete examination of the instant application, the claimed rejected under 35 U.S.C. 101 as non-statutory subject matter are further rejected as set forth below in anticipation of applicant amending the claims to place them within the four categories of invention.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 13, 15, 20, 21, 23, 25, 26, and 28 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims all include the phrase "containing one of an organ, anatomic and pathological feature". However, the use "and" does not make sense with the description of "containing one of". In contrast, the phrase would make sense stated as: "containing one of an organ, anatomic feature ~~and~~ or pathological feature".

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 3, 5, 7-9, 13, 14, 18-20, 22-25, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gering (NPL Document "A System for Surgical Planning and Guidance using Image Fusion and Interventional MR") in view of Payne (NPL Doc, "Distance Field Manipulation of Surface Models").

As per claim 8, Gering teaches the claimed:

8. A computer program product for volume visualization for extracting meaningful information from 3D volumetric data *(towards top of page 20, "The surface models can then be visualized in the 3D view along with the reformatted slices, and the slices can selectively clip away potions of some models, such as the skin, to reveal other unclipped models beneath, such as a tumor")*, the computer program product comprising computer instructions for:

obtaining volume data from a source; *(page 45 in figure 2-13, where the source can be "0.5 T MR Scanner")*

performing image segmentation on the 3D volume data to identify a predetermined feature of the volume data and voxels that defines the surface of the identified predetermined feature of the volume data; *(page 41, figure 2-10, "The label map of a tumor is created by segmenting slices (top). Next, a polygonal surface is created to encompass the segmentation")*

volume rendering the 3D volume data to create a 2D image of the 3D volume data; *(on page 45, in figure 2-13, where the 3D view (which has second voxels) is shown on a LCD display monitor as shown, where the LCD display monitor displays the second voxels as a 2-dimensional image)*

providing a user interface to enable a user to interactively select a voxel distance of a

voxel to the reference surface; *(page 42, figure 2-11 and towards top of page 20, "The surface models can then be visualized in the 3D view along with the reformatted slices, and the slices can selectively clip away potions of some models, such as the skin, to reveal other unclipped models beneath, such as a tumor" where the distance to the reference surface can be specified in terms of this selective clipping away from the model, i.e. distance from the outer skin)*

visualizing the output of the volume rendering as a 2D image *(see output screen on page 21, in figure 1-3, where the rendered second voxels are display on the monitor as a 2-dimensional image).*

Gering does not explicitly teach the remaining claim limitations.

Payne teaches the claimed:

using the defined surface of the identified predetermined feature of the volume data as a reference surface, assigning to one of voxels within the defined surface and voxels without the defined surface a value indicative of the distance of each of the voxels from the defined surface; *(1st paragraph on first page, "To manipulate surfaces more effectively, we develop a method that uses distance fields—the scalar fields derived from triangle-based surface models" where the tri-based surface model serves as the reference surface and towards the lower portion of the 1st col on page 66, "A suitable field is the distance field, which represents the distance from a surface as a signed magnitude" where this surface is a reference surface because the distance is measured in terms of distance from this reference surface, and towards the lower portion of the 1st col on page 66, "Raya and Udupa used voxel models' distance fields to interpolate structures in two and three dimensions" where voxels can a distance from the reference surface as well)*

controlling said volume rendering to create a 2D image of the 3D volume data wherein the voxels in the 2D image are all equidistant from the reference surface and thereby constitute a surface parallel to the reference surface spaced therefrom by the selected voxel distance; *(top of 1st col on page 66, "2. Offsets: What is the surface a fixed distance above or below a given surface?" and middle of 1st col on page 68, "computing the surfaces a fixed distance into a model ... This method lets us compute surfaces of fixed thickness from arbitrarily convoluted surfaces")*

creating an output of the 2D image from the volume rendering that is indicative of the surface parallel to the reference surface and spaced therefrom by the selected voxel distance; *(top of 1st col on page 66, "Offsets: What is the surface a fixed distance above or below a given surface? ... The cortex of the brain, for example, is organized into layers (laminae) that might by accessible by offset surfaces" and Figure 2 and its caption, "We produced this surface (shown solid textured) as an offset the outer transparent surface" where figure 2 is an output of a 2D image).*

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Gering with Payne. Payne teaches one advantage of the combination (in the 1st paragraph on the 1st page, "But manipulating surfaces using either direct or implicit methods present a number of challenges. To manipulate surfaces more effectively, we developed a method that uses distance fields—the scalar fields derived from triangle-based surface models").

As per claim 9, Gering does not explicitly teach the claimed limitations.

Payne teaches the claimed:

9. The computer program product of claim 8, comprising further instructions for of controlling said volume rendering via the user interface to create a series of 2D images of the 3D volume data wherein voxels in each 2D image are all equidistant from the reference surface, the voxel distances for the 2D images of the series are different so that a series of surfaces parallel to the reference surface are obtained, each spaced by a different voxel distance *(top of 1st col on page 66, "2. Offsets: What is the surface a fixed distance above or below a given surface?" and middle of 1st col on page 68, "computing the surfaces a fixed distance into a model ... This method lets us compute surfaces of fixed thickness from arbitrarily convoluted surfaces" where repeating this process with different fixed thicknesses can produce a plurality of such parallel surfaces because each surface is based upon a fixed distance from the original reference surface and thus each would be parallel to one another)*

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Gering. Payne teaches the advantage of the combination *(top of 1st col on page 66, "Offsets: What is the surface a fixed distance above or below a given surface? ... The cortex of the brain, for example, is organized into layers (laminae) that might by accessible by offset surfaces" where examining the layers would be simpler using the technology of Payne).*

As per claim 14, Gering teaches the claimed:

14. The computer program product of claim 8, wherein the volumetric data is medical image data. *(page 21, in figure 1-3, where a medical image data is shown).*

As per claim 19, this claim is similar in scope to claim 8, and thus is rejected under the same rationale.

As per claim 3, Gering does not explicitly teach the claimed limitations.

3. The method of claim 19, wherein the distance from the reference surface being determined along a direction of projection. *(page 62, caption in figure 3-2, "Trajectory planning is performed by positioning points for entry (yellow) and target (red), and examining the reformatted planes oriented relative to the connecting path" where the direction of projection is a trajectory, in this instance, a distance is defined between the entry and target locations).*

As per claim 5, Gering does not explicitly teach the claimed limitations.

Payne teaches the claimed:

5. The method of claim 19, wherein the distance measure being an Euclidean distance. *(middle of 1st col on page 67, "Euclidean distance calculation").*

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Gering in order to utilize a well-proven and effective means for measuring distance.

As per claim 7, Gering teaches the claimed:

7. The method of claim 19, wherein the volumetric data being three dimensional microscopy data. *(page 76, section 4.3.3, "The key in this application is that the lesion is benign, small, and difficult to find ... The 3D Slicer can significantly reduce risk of damage by guiding the surgeon*

more directly toward small lesions" where the small lesions can be microscopy data on the volumetric display).

As per claim 18, Gering does not explicitly teach the claimed limitations.

Payne teaches the claimed:

18. The method of claim 19 further comprising the step of reformatting the volumetric data *(middle of 1st col on page 66, "To apply these implicit surface methods to given surface models, we must first represent the models by scalar fields")* to group the voxels according to values indicative of the distance of the voxels from the defined surface distance *(bottom of 1st col on page 66, "3. Extract a new surface as the isosurface of the final field" and middle of 1st col on page 68, "We can compute these simply by taking the isosurfaces of the distance field" where these isosurfaces can be group and these isosurfaces are a given distance from the defined surface).*

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Gering. The motivation of claim 1 is incorporated herein.

As per claim 22, this claim is similar in scope to claim 9, and thus is rejected under the same rationale.

As per claim 20, the reasons and rationale for the rejection of claim 8 is incorporated herein.

Gering teaches the claimed:

subjecting a patient to a scanning technique to obtain a sequence of 2D slices of a preselected

body portion containing one of an organ, anatomic and pathologic feature of the patient; *(figure 2-13, the "0.5 T MR Scanner" and towards the bottom of page 32, "Volume data is stored as a stack of 2D images as displayed in Figure 2-3" which contains an organ)*

manipulating said sequence of 2D slices to obtain 3D volume data,

performing image segmentation on the 3D volume data to identify one of an organ, anatomic and pathologic feature of the patient and determining from the portion of the 3D volume data that constitutes the identified one of an organ, anatomic and pathologic feature of the patient the surface of the one of an organ, anatomic and pathologic feature of the patient; *(pg. 36, caption of figure 2-5, "the outline of the tumor segmentation is drawn in green on an anatomical image on the left, and on a vascular image on the right. BOTTOM: The vascular image is fused with the anatomical image using uniform blending on the left, but selective overlay on the right").*

Gering does not explicitly teach the remaining claim limitations.

Payne teaches the claimed:

using the determined surface of the one of an organ, anatomic and pathologic feature of the patient as a reference surface, assigning to one of voxels within the determined surface and voxels without the determined surface a value indicative of the distance of the voxel from the determined surface; *(towards the lower portion of the 1st col on page 66, "A suitable field is the distance field, which represents the distance from a surface as a signed magnitude" where this surface is a reference surface because the distance is measured in terms*

of distance from this reference surface, i.e. the outer brain surface, and towards the lower portion of the 1st col on page 66, "Raya and Udupa used voxel models' distance fields to interpolate structures in two and three dimensions" where voxels can form the reference surface as well).

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Gering. The motivation of claim 1 is incorporated herein.

As per claim 13, Gering teaches the claimed:

13. The method of claim 20, wherein the body structure is an organ or other pathological structure. *(on page 33, in figure 2-3, where it shows the body structure as an organ).*

As per claim 23, this claim is similar in scope to claim 9, and thus is rejected under the same rationale.

As per claim 24, the reasons and rationale for the rejection of claim 8 is incorporated herein. The examiner will examine and interpret this claim under 35 USC 112, 6th paragraph. Gering teaches the means for obtaining volume data *(page 45, in figure 2-13, the scanner system")*, means for performing image segmentation *(page 45, in figure 2-13 where the Workstations and Console provide processing and memories capabilities)*, and means for performing other volume data manipulation techniques *(page 45, in figure 2-13 where the Workstations and Console provide processing and memories capabilities).*

As per claim 27, this claim is similar in scope to claims 9 and 24, and thus is rejected under the same rationale.

As per claim 25, this claim is similar in scope to claims 20 and 24, and thus is rejected under the same rationale.

As per claim 28, this claim is similar in scope to claims 9 and 24, and thus is rejected under the same rationale.

3. Claims 15, 21, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gering (NPL Document "A System for Surgical Planning and Guidance using Image Fusion and Interventional MR") in view of Payne (NPL Doc, "Distance Field Manipulation of Surface Models") in further view of Gillick et al. (US Patent 5,530,455).

As per claim 21, the reasons and rationale for the rejection of claims 8 and 20 are incorporated herein.

Gering does not explicitly teach the claimed limitations relating to the mouse wheel.

Gillick teaches the claimed:

to enable a user to interactively select a voxel distance to the reference surface by means of a wheel mouse, the rotation of the wheel of the wheel mouse being correlated with the user's selection of a voxel distance; *(col 2, lines 29-33, "to operate under the control of a mouse with a roller which implements scrolling. The turning of the roller, in conjunction with driver*

software, generates scroll signals to Windows which mimics the action of the user clicking in the scroll controls" where this scrolling control can be applied to the distance selecting of Gering) It would have been obvious to one of ordinary skill in the art to combine Gering, Payne, and Gillick in order to improve performance in programs by adding a mouse wheel capability for scrolling functions (col 2, lines 21-24), for example, improved capabilities to scroll to navigation a user interface.

As per claim 15, this claim is similar in scope to claim 13, and thus is rejected under the same rationale.

As per claim 26, the reasons and rationale for the rejection of claim 9 is incorporated herein. The examiner will examine and interpret this claim under 35 USC 112, 6th paragraph. Gering teaches the means for obtaining volume data *(page 45, in figure 2-13, the scanner system")*, means for performing image segmentation *(page 45, in figure 2-13 where the Workstations and Console provide processing and memories capabilities)*, and means for performing other volume data manipulation techniques *(page 45, in figure 2-13 where the Workstations and Console provide processing and memories capabilities)*.

Response to Arguments

4. Applicant's arguments filed 7/2/2007 have been fully considered but they are not persuasive.

Applicant argues "In contrast, the independent claims of the present invention create parallel surfaces to the surface of a feature, such as a body organ, a lung, which is an irregular geometric figure ... This is not possible using the prior art in the manner described or sought to be cobbled together" (bottom of page 12 in filed response).

The examiner respectfully maintains that the rejections are proper because applicant's arguments are based upon differences between the previous prior art rejections and the recently added limitations to the claims or recently added new claims (i.e. relating to parallel surfaces and irregular geometric figures). In addition, the prior art rejections in this office action now address the new claim limitations that rely upon Payne for teaching the particular and more in-depth concepts relating to the claimed reference surface volumetric manipulations.

Applicant argues "However, as mentioned above the goal of the present patent application is not to provide a simple cross-section, but to provide a 2D projection of an inner layer of an object, with the inner layer of the object being parallel to the outer layer" (bottom of page 12 in filed response).

The examiner respectfully maintains that the rejections are proper because applicant's arguments are based upon differences between the previous prior art rejections and the recently added limitations to the claims or recently added new claims (i.e. relating to parallel surfaces and accessing parallel inner layers of an object). In addition, the prior art rejections in this office action now address the new claim limitations that rely upon Payne for teaching the particular and more in-depth concepts relating to the claimed reference surface volumetric manipulations.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel F. Hajnik whose telephone number is (571) 272-7642. The examiner can normally be reached on Mon-Fri (8:30A-5:00P).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka J. Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DFH

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SUPERVISORY PATENT EXAMINER